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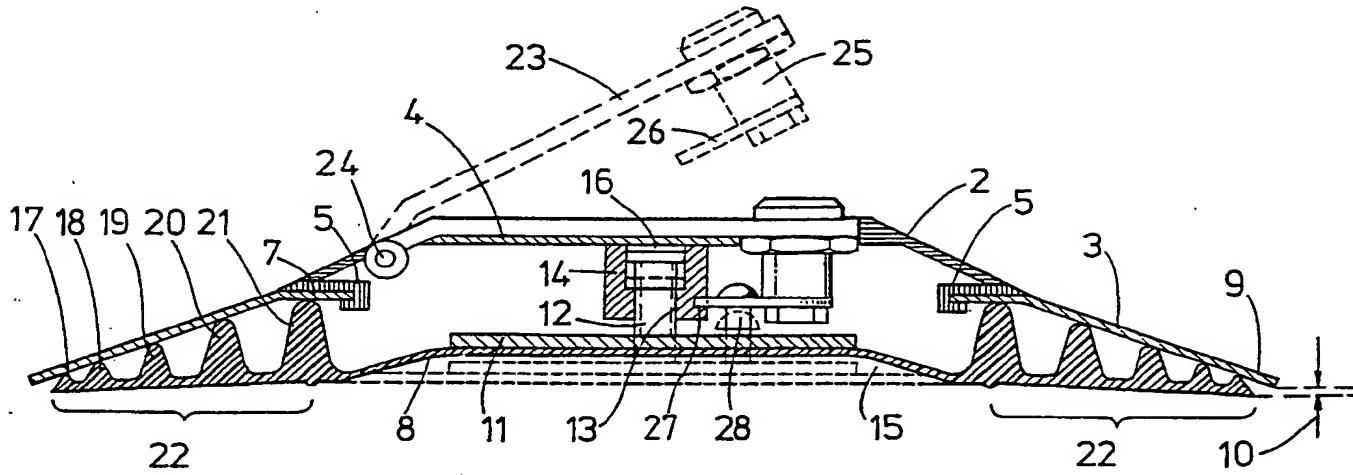
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(71) Applicant (<i>for all designated States except US</i>): BESS SWEDEN AB [SE/SE]; Övre Fogelbergsgatan 3, S-411 28 Göteborg (SE).		
(72) Inventor; and		
(75) Inventor/Applicant (<i>for US only</i>) : ZELL, Ulf, L. [SE/SE]; Övre Fogelbergsgatan 3, S-411 28 Göteborg (SE).		
(74) Agents: SVANFELDT, Hans-Åke et al.; Dr. Ludwig Brann Patentbyrå AB, Box 1344, S-751 43 Uppsala (SE).		

(54) Title: ANTI-THEFT DEVICE



(57) Abstract

An anti-theft device of the view-concealing type with a cover (1), a suction cup (8) and an operating member for operating the suction cup. A plate (11) is rigidly attached in the suction cup, and with the aid of manually operated means (23, 2, 14, 12) the suction cup is activated so that its retaining force will be greater than the rupture limit of the material in the object to be protected against theft. Electromagnetic and/or permanent magnet means may be used for activating the suction cup.

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Anti-theft device

The present invention relates to an anti-theft device in the shape of a metal cover inside of which there is arranged a suction cup intended for being applied to the object which is to be protected against theft or unauthorized use.

An anti-theft device of this kind is known, e.g. from the German patent specification 581.812 or the British patent 2.091.658, see also the German patent 3.248.415.

The drawback with these known devices is that they require a rigidly mounted holder element, e.g. on a vehicle, for the view-concealing member of the anti-theft device.

The object of the present invention is to provide an anti-theft device, which permits attaching the view-concealing member of the anti-theft device directly to the object which is to be protected, without the use of a holder member rigidly mounted on the vehicle.

Another object of the invention is to provide an anti-theft device which is not only intended for automobiles and boats but can also be used on computer monitors, for thus preventing the unauthorized use of the computer.

The anti-theft device has two functions with automobile, boat and computer applications, namely a view-concealing function and an indicating function which notifies that the item in question is property protected against theft.

In accordance with the invention, the anti-theft device is a suction cup attached directly to the outside of a window pane, on the boat hull or the surface of the monitor screen, and which is covered by a taper-proof cover. The suction cup is provided with means which on being activated results in that the cup generates a restraining force which is greater than the rupture limit of the material in the object protected by the device.

Still another object of the invention is to provide an anti-theft device in which the suction force of the suction cup is accurately adjustable.

A further object of the invention is to ensure that the device cannot be removed from the protected objects in an unauthorized manner by inserting a screw-driver, knife or the like between the cover and the protected object, the screw-driver or the like being thrust in so far that air can penetrate under suction cup, thus causing the adhesion of the device against the protected object to cease. To prevent this situation from occurring the cover of the device and the diaphragm forming the suction cup are made in the way disclosed in the accompanying claims 3-5. Due to this embodiment, only insubstantial objects can be thrust in between the cover and the protected object. Such an insubstantial object must be thrust in a long distance to come into the vacuum area of the suction cup, more specifically a distance corresponding to the width of the circular ring area. Since the material of the suction cup is rather massive and rather elastic, in addition to which it engages with a large force against the protected object, such an insubstantial object will only buffet against the circular ring area of the diaphragm, due to frictional forces, shear forces and other general resistance, and it will never reach the vacuum area of the suction cup.

The means mentioned for activating the suction body, in the present preferred embodiment of the invention, is a manually activated mechanical turning mechanism. Instead of such a turning mechanism an electromagnetic means or permanent magnetic means can be used, which co-act with a plate of magnetic material arranged on the inside of the pane of glass on the vehicle for co-action with these means.

The invention will now be described in more detail below and with reference to the accompanying drawings, where

Figure 1 is a cross-sectional view of the protective device in accordance with the invention,

Figure 2 is a plan from above of the device in Figure 1, and

Figure 3 is a plan from below of a second embodiment of the invention.

The protective device of Figure 1 includes a metal cover 1 for placing against an unillustrated object which is to be protected, e.g. the front surface of an automobile. The cover 1 is dished and comprises an upper turnable part 2 and a lower fixed part 3. The upper part 2 has a flat portion 4. The upper and lower parts are rotatably connected to each other by a sliding bearing 5 in the form of a ring welded to the upper part 2 and provided with an external, radial groove 6 slidably accommodating a radially outwardly directed flange 7 in the upper edge portion of the lower part 3. The cover is suitably made from steel sheet or hardened steel sheet, which prevents unauthorized perforation, e.g. by drilling. The diameter of the lower part is about 30 cm and the upper part has a diameter of about 17 cm.

A diaphragm 8 of elastomeric material has a shape corresponding to the circular shape of the cover and the size which is insignificantly less than that of the cover so that the cover above it protects the diaphragm from unauthorized interference. The diaphragm 8 has a thickness tapering in a radial direction in the radially outmost portion of the cover. The radially outmost portion 9 of the cover extends past the outmost edge of the diaphragm 8 and down to the upper surface of the protected object, to form a minimum gap 10 which substantially prevents unauthorized insertion of objects under the cover. A disk 11 is rigidly mounted in the central portion of the diaphragm 8, e.g. by vulcanizing into the material of the diaphragm 8. A pin 12 is fixed to the disk 11. The pin 12 is provided with a thread 13, e.g. a buttress or acme thread of large pitch. A sleeve 14 is rigidly mounted on the inside of

the flat portion 4 of the upper part of the cover and is provided with an internal thread meshing with the thread 13 on the pin. It will be understood that when the upper part of the cover is turned through a given angle the sleeve will pull the plate 11 upwards, and thereby the diaphragm 8 from the position illustrated by dashed lines in Figure 1 to an upper position illustrated by full lines. The diaphragm 8 thus forms a suction cup and a vacuum is created in the space 15 formed between the suction cup and the protected object. The sleeve can be provided with an unillustrated end stop 16 preventing the plate 11 from being pulled out so far that the pane of glass cracks. The end stop 16 may be such as a solid cylinder loosely inserted in the sleeve to become clamped between the upper end of the pin 12 and the flat portion 4 when maximum rise has been obtained for the diaphragm 8.

The diaphragm 8 is provided with a plurality of concentric, annular beads 17, 18, 19, 21 of heights such that their peaks engage against the underside of the lower part 3 of the cover. The force with which the plate 11 of the suction cup is pulled upwards when the upper part 2 of the cover is turned will then be transmitted through the cover and from the cover to the peaks of the beads down to a wide circular ring area situated round the diaphragm 8. For the dimensions given, a pressure of 0,6 bar has been measured inside the space 11 when the suction cup assumes the position illustrated by full lines in Figure 1, and this pressure provides an engagement force between the protective device and the protected object of about 136 kp. It will be understood that the suction force is proportional to the angle through which the upper part 4 of the cover has been turned and the pitch of the thread 13.

For turning the upper part 2 of the cover there is an operating arm 23 hinged attached to the upper rotatable part 3 of the cover at a hinge 24, for serving as a crank for turning the cover when the device is to be applied or removed from the

protected object. At the free end of the arm there is a conventional cylinder lock 25 operated by a key, and the cylinder is provided with a locking plate 26 co-action with a recess 27 in the sleeve 14 for locking the operating arm in the position illustrated by full lines in Figure 1. In accordance with an alternative embodiment, the locking plate 26 can be arranged to co-act with a locking pin 28 rigidly mounted on the plate 11. An opening 29, accommodating the cylinder 25 and locking plate 26 is arranged in the upper portion 4 of the cover such as to enable the operating arm 23 to assume its locked position.

In Figure 3 there is illustrated in a plan view from below an embodiment of the invention where the retaining force is generated magnetically, this kind of embodiment also being regarded as a suction device for the purpose of simplicity. For this to be possible an attraction plate, e.g. of iron, is required on the inside of the glass pane. When the inventive anti-theft plate is to be applied to the outside of the pane, the attraction plate is placed on the inside thereof. A plurality of small permanent magnets 30 are arranged on the attraction plate and they are sufficiently strong to generate a temporary retaining force when the cover is placed against the outside of the pane for co-action with the plate on the inside thereof.

There is an iron core 31, having a torus shape in the illustrated embodiment, this core being wound with wire 32 to form a torus-shaped electromagnet. The electromagnet has approximately the same extension as the iron plate on the inside of the pane. The winding of the electromagnet is connected to a battery 33 via a switch 34 which is controlled with the aid of a lock 35. All these parts 30-35 are placed under the cover 2 and around the plate 11.

The lock 35 is illustrated schematically in Figure 3, but is suitably arranged in the same way as the lock in Figure 1, i.e. in the upper part of the cover so that it is easily

accessible for the key 36.

For activating the electromagnet, the key 36 is inserted in the lock 35 and the current is switched on by turning the key, an electromagnetic force being generated which is sufficiently strong to make it impossible to remove the anti-theft device without breaking the pane of glass, or car windscreen or removing it from its frame.

A third possibility of implementing the device in accordance with the invention is to provide it solely with permanent magnets in a configuration of the same type used for fastening workpieces in lathes with the aid of magnetic chucks, or for fastening workpieces on grinding machines. In this case mechanical levers or screw devices are used for separating the co-acting permanent magnet and attraction plate on the inside of the pane.

The invention can be modified in many different ways and can be varied according as the field of use. For automobile windows, which are often curved, it is suitable for the cover and the suction cup diaphragm to have a circular or oval shape. For monitors with substantially rectangular window it may be suitable for the cover and diaphragm to be substantially square while the plate 11 has a circular shape.

CLAIMS

1. Anti-theft device of view-concealing indication type, characterized by
 - a metal cover (1) for applying to an object which is to be protected against theft or unauthorized use,
 - a lockable suction cup (8) arranged inside the cover and having the ability of generating a retaining force which is greater than the rupture limit of the material in the object protected against theft, and
 - means for operating the suction cup.
2. Device as claimed in claim 1, characterized in that said means for operating the suction cup include:
 - a plate (11) fixedly arranged on the suction cup,
 - a pin (12) with a thread (13), upstanding from said plate and rigidly attached thereto,
 - a sleeve (14) having one end rigidly attached to the inside of the cover and having an internal thread meshing with that on the pin,
 - said means enabling turning the cover through a predetermined angle such as to cause the sleeve to pull the plate and thereby the suction cup with a force proportional to the angle through which the cover is rotated.
3. Device as claimed in claim 2, characterized by an end stop (16) co-acting with said pin for limiting the angle through which the cover can be rotated and thereby limiting the suction of the the suction cup against the protected object.
4. Device as claimed in claim 1 or 2, wherein the cover has a substantially circular, dished shape, characterized in that the suction cup is formed by a diaphragm (8) of elastomeric material having a shape corresponding to the circular shape of the cover and with a size which is insignificantly less than that of the cover so that the cover protects the diaphragm against unauthorized action.

5. Device as claimed in claim 4, characterized in that the thickness of the diaphragm (8) tapers radially outwardly in the outmost portion of the cover and that the radially outmost portion (9) of the cover extends radially outwards past the outer edge of the diaphragm, as well as extending downwards towards the surface of the protected object such as to form a minimum gap (10) which substantially prevents unauthorized insertion of objects under the cover.

6. Device as claimed in claim 4, characterized in that the diaphragm (8) is provided with a plurality of concentric, annular beads (17, 18, 19, 20, 21) having heights such that the crests of the beads engage against the underside of the cover for taking up the force with which the plate (11) of the suction cup is pulled upwards when the cover is turned, and for transmitting this force to a wide circular ring area (22) situated round the diaphragm (8).

7. Device as claimed in one or more of the preceding claims, characterized in that the dished cover is divided into two parts, an upper part (2) and a lower part (3), along an imagined intersection line in a plane parallel to the bottom surface (4) of the cover or dish, the upper and lower parts being connected for rotation to each other with the aid of a sliding bearing (5).

8. Device as claimed in claim 7, characterized in that the sliding bearing includes a grooved ring rigidly attached to one cover part, while the other cover part has a radially inwardly extending flange (7) slidably accommodated in said groove.

9. Device as claimed in claim 1, and including a conventionally lockable operating arm, characterized in that said arm (23) is hingedly attached to the upper rotatable part (2) of the cover for serving as a crank for turning the cover when the device is applied to, or removed from, the object protected

against theft.

10. Device as claimed in any one or the preceding claims, characterized in that one end of the operating arm is provided with a hinge (24) attached to the upper rotatable part (3) of the cover, and in that the operating arm has at its opposite end a locking cylinder (25) with a locking plate (26) co-acting with a locking member (27).

11. Device as claimed in claim 9, characterized in that in its upper part (4) the cover has an opening (29) for the cylinder lock and locking plate, said opening being suitably arranged in relation to the hinge on the other side of the centre of the upper part (2) of the cover.

12. Device as claimed in claim 1, characterized in that said means for operating the suction cup includes

- a plate (11) rigidly attached to the suction cup,
- magnetic means (30, 31, 32) arranged on said plate, and
- a plate of magnetic material intended for placing on the opposite side of the object which is to be protected.

13. Device as claimed in claim 12, characterized in that said magnetic means is an electromagnet (31, 32) energized by a battery (33) and activated by a key-operated lock (34-36).

14. Device as claimed in claim 12, characterized in that said magnetic means is a plurality of permanent magnets (30) arranged on said plate (11).

Fig. 1

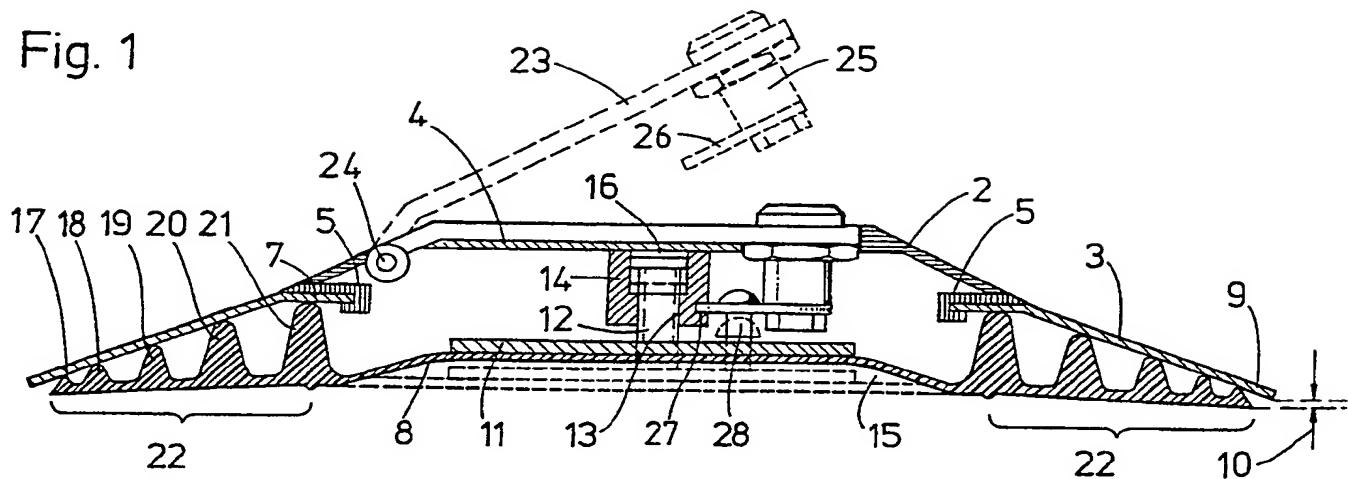
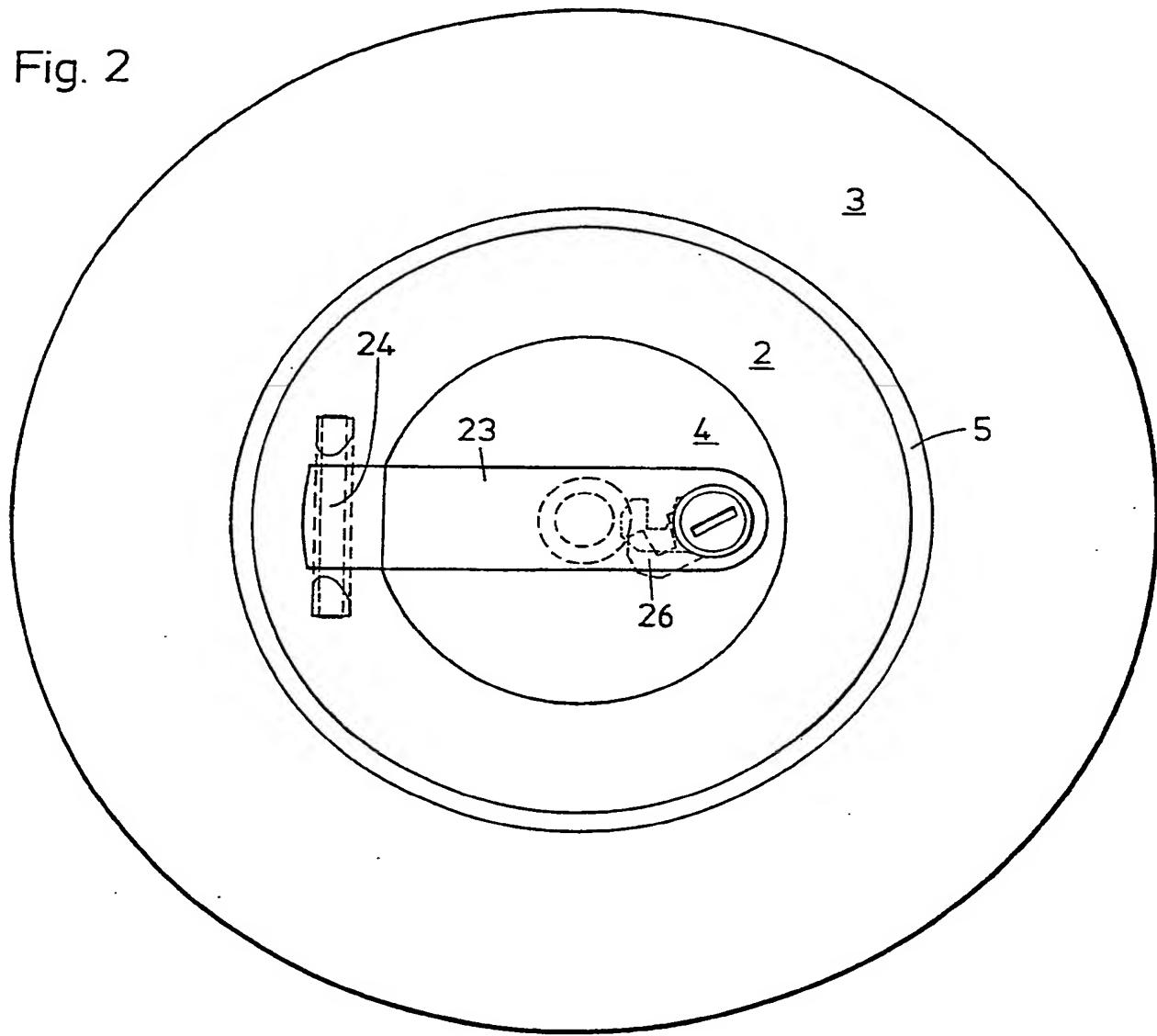


Fig. 2



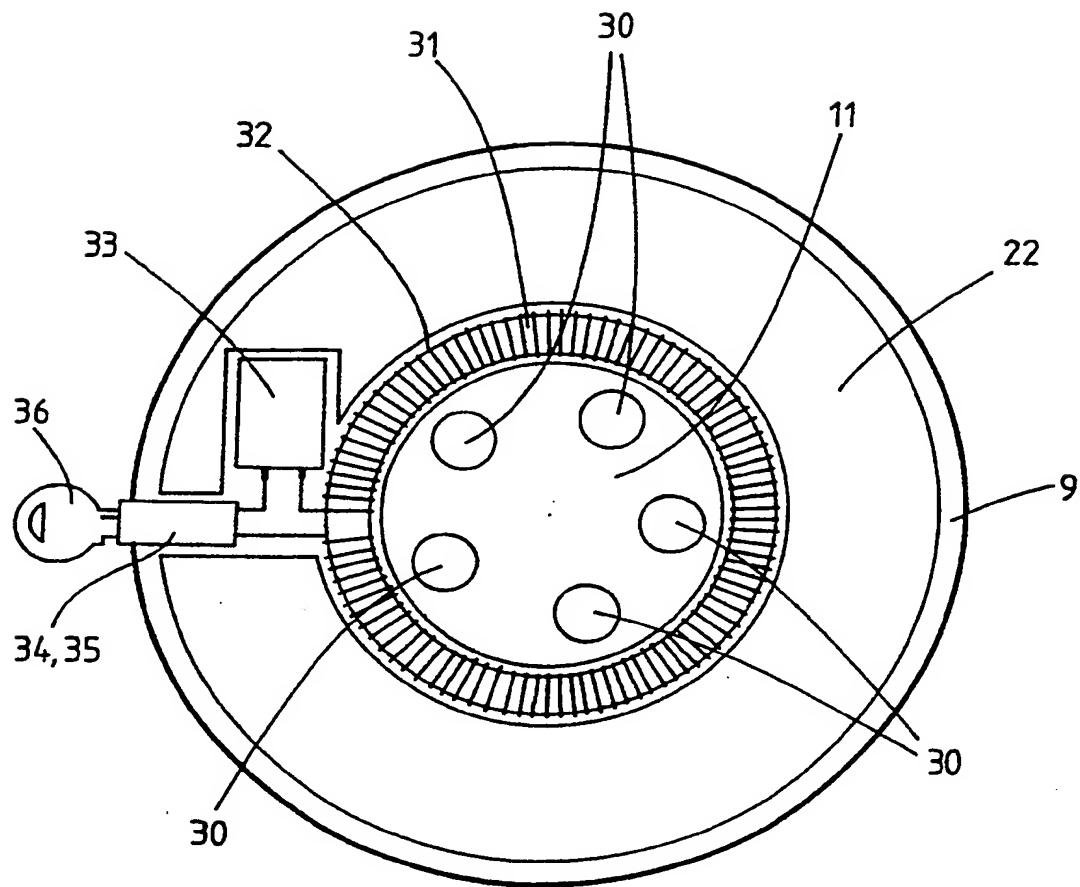


Fig. 3

INTERNATIONAL SEARCH REPORT

International Application No. PCT/SE89/00444

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *

According to International Patent Classification (IPC) or to both National Classification and IPC 4

B 06 R 25/00, G 12 B 9/04

II. FIELDS SEARCHED

Minimum Documentation Searched ?

Classification System	Classification Symbols
IPC 4	B 06 R 25/00; G 12 B 9/04; B 64 B 19/02; H 04 N 5/64
Nat Cl	63c:71
US Cl	116:33; 70:158, 163, 174, 237; 180:114, 287, 289

Documentation Searched other than Minimum Documentation
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SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT *

Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	GB, A, 2 091 658 (EDWARD JAMES CARTER) 4 August 1982	
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IV. CERTIFICATION

Date of the Actual Completion of the International Search

1989-10-24

Date of Mailing of this International Search Report

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International Searching Authority

Swedish Patent Office

Signature of Authorized Officer

Hans Nordström